DOI:
10.1016/j.ejogrb.2017.11.012

Document Version
Peer reviewed version

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PII: S0301-2115(17)30522-5
DOI: https://doi.org/10.1016/j.ejogrb.2017.11.012
Reference: EURO 10117

To appear in: *EURO*

Received date: 14-7-2017
Revised date: 17-10-2017
Accepted date: 13-11-2017

Please cite this article as: Moore Amanda P, D'Amico Maria I, Cooper Natalie AM, Thangaratinam Shakila.Designing a lifestyle intervention to reduce risk of type 2 diabetes in postpartum mothers following gestational diabetes: An online survey with mothers and health professionals.*European Journal of Obstetrics and Gynecology and Reproductive Biology* https://doi.org/10.1016/j.ejogrb.2017.11.012

Designing a lifestyle intervention to reduce risk of type 2 diabetes in postpartum mothers following gestational diabetes: An online survey with mothers and health professionals

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Abstract

Objective

The aim of this study was to identify what components of a postpartum lifestyle intervention would engage postpartum mothers who had a diagnosis of gestational diabetes.

Study design

Two online surveys were conducted, one involving postnatal mothers with GDM (n=83), and a second for health professionals (n=46).

Results

Seventy-eight percent of mothers were aware that healthy eating, exercise and weight management were all important to reduce risk of subsequent type 2 diabetes. However, 80% of women in this survey were not ready to engage in a postpartum lifestyle intervention within the first 6 months of giving birth; in contrast 52% of health professionals recommended they should be engaged in the first six weeks. Group sessions were the most commonly chosen format to deliver an intervention (30%). A community setting was preferred to a medical one. Mothers wanted recipe ideas (95%) in preference to general dietary advice (76%) or cooking skills courses (39%). Walking was the main form of exercise for 79% of mothers in this sample. Women highlighted difficulty in focusing on their own health goals because of competing demands of looking after a baby (41% agreed, Median 3, IQR 2), tiredness (65% agreed, Md 4, IQR 1) and the need for childcare (64% agreed, Md 4, IQR 2).

Conclusion

A walking programme, recipe ideas and weight monitoring may be useful components when designing a postpartum lifestyle intervention. Barriers to engagement are evident and the intervention should allow women to engage at a time that is appropriate for them.

Keywords: Gestational diabetes; Weight; Postpartum; survey; Pregnancy; Women's Health; Type 2 diabetes, lifestyle intervention

Introduction

The rise in obesity has led to an increase in the number of women diagnosed with gestational diabetes (GDM), a condition characterised by glucose intolerance first detected during pregnancy[1]. Approximately 40% of women with GDM progress to type 2 diabetes mellitus in the first five years following delivery[2]. Furthermore, women with GDM are at risk of cardiovascular disease, ophthalmic morbidity, female malignancies and high rates of obesity in their offspring[3-5]. A diagnosis of GDM presents an opportunity to identify women at increased risk of developing type 2 diabetes, and to offer them interventions that could reduce this risk.

Lifestyle interventions involving weight-loss, diet and exercise are effective in reducing the progression to type 2 diabetes mellitus in non-pregnant, pre-diabetes populations[6]. Randomised trials on effects of intervention after a diagnosis of GDM have shown varied effects in reducing the risk factors for diabetes, alongside breastfeeding and pharmacological intervention, lifestyle based interventions, show potential to reduce progression to type 2 diabetes mellitus[7], however robust trial data for the effectiveness of lifestyle intervention is limited to date and comes primarily from Asia and the US[8].

In the postpartum period, competing needs of a young baby can limit motivation for weight loss[9], healthy eating[10] and intensive lifestyle intervention[11, 12] and can make it difficult to

engage women in interventions. It has also been reported that women who had GDM may not be aware, or concerned about their diabetes risk[13, 14] which may influence their postpartum health behaviours.

This study has been undertaken to inform the design of a lifestyle intervention for postpartum GDM mothers in the UK. The objectives were to understand what would be the best timing to recruit to an intervention, what mothers and health professionals thought the programme should include and in what format it should be delivered. The authors also aimed to understand the influence of barriers to engagement to positive postpartum health behaviours in this population and whether health professionals who advised women with GDM about weight and post-natal health, would support referring women into a lifestyle intervention.

Methods

Design and setting: Two on-line surveys were carried out between February 2015 and January 2016, one involving postnatal women in UK with a diagnosis of GDM in a recent pregnancy, and a second involving healthcare professionals caring for women with GDM. The surveys were hosted on-line using an on-line survey tool (Survey Monkey, Portland, USA). Ethical approval was provided by Queen Mary University of London (QMUL) ethics committee (Ref: QMERC2014/76).

Participants: An opportunistic sample of UK resident post-natal mothers with a self-declared diagnosis of GDM was recruited via on-line forums such as Diabetes UK forum, Netmums and Mumsnet, and social media. Eligibility was confirmed through explicit questions within the survey. The healthcare professionals were identified via email and social media at Barts Health NHS Trust. "Snowballing" was encouraged, whereby respondents could forward the online survey link to their contacts, to maximise the diversity of response[15]. Only UK healthcare professionals who supported postnatal women as part of their normal clinical

practice, confirmed by explicit questions. Respondents were excluded if they did not meet these criteria.

Survey: The 28-item questionnaire for mothers was designed for this project to develop a understanding of what type of intervention mothers who had GDM would find helpful and engaging. The design was informed by conducting post-natal discussion groups with mothers who were diagnosed with GDM in their recent pregnancy. Questions covered recruitment timing, intervention content, format and delivery as well as health behaviour and attitudes to diet, weight and exercise. Basic demographic data were also collected. The healthcare professionals' survey comprised of 17 questions focussing on perceived barriers and facilitators to discuss weight-related issues in the postnatal period in women with GDM, their current practice to support these women, views about what would make an intervention successful, appropriate timing of intervention in the postpartum period, and their interpretation of their patient's motivation to engage in lifestyle changes to minimise risk of type 2 diabetes.

The questionnaires included both open format questions, multiple choice questions and questions with a Likert scale response[16]. Both questionnaires were piloted within a small sample to check the clarity and performance of the on-line questionnaire.

Analysis:

Participants' response to individual questions were reported as a median score and analysed using Mann-Whitney and Kruskal Wallis non-parametric tests[16,17]. Certain sets of questions, such as those concerning general attitudes to exercise, weight and diet on the mothers' survey were analysed collectively as Likert Scale data, to give a composite health behaviour score which was analysed by ANOVA[16,17]. Scoring of negative questions was reversed, so a high score was an indicator of positive attitude towards postnatal health behaviour. We grouped ethnicity as Caucasian, and Black and minority ethnic group (BME), Body Mass Index as

normal weight 18-24.99; overweight 25-29.99; obese ≥30, and educational status as highest attainment GCSE, A level or tertiary education. All analyses were undertaken using SPSS 23.0 (SPSS Inc., Chicago, USA). Completed surveys were checked for missing data and responses in which a large number of questions were skipped, were excluded from the analysis.

Results

Overall 129 participants completed the surveys, including 83 mothers and 46 healthcare professionals.

Participant characteristics

The characteristics of mothers who participated are provided in Table 1. Participants were predominantly Caucasian (67%) and well educated (64% had tertiary education). Fifty eight percent were either overweight or obese and 17% were normal weight. 25% of participants chose not to provide their weight and height. The mean BMI was 28.38 (SD 5.04). The sample of healthcare practitioners comprised of 24 obstetricians, 8 diabetologists, 8 midwives, 5 General Practitioners, and 1 dietitian. They were involved in the care of mothers from a predominantly South Asian population.

Design of a lifestyle intervention

When is the best time to engage women?

The responses from mothers varied on optimal timing to receive information on lifestyle and weight management, with 26% (21/81) preferring six-weeks, 23% (19/81) in the first three months, 31% (25/81) between 3 and 6 months and 20% (16/81) after 6 months. Fifty-two

percent (24/46) of professionals felt that the 6-week check was the ideal time to engage women and 48% (22/46) felt it should be flexible according to when a mother was ready.

How should the intervention be delivered?

The preferred choice of delivery of the intervention or service was group sessions (30%, 25/83) followed by mobile/internet support (24%, 20/83) and 1:1 support sessions (24%, 20/83). Home visits and a buddy scheme were less popular modes of intervention delivery, (13% and 9% respectively (11/83 and 7/83). Mothers were more likely engage in sessions held in the community (39%, 32/83) than in a medical setting (15%, 12/83). Group sessions were also recommended by 45% (19/42) of professionals; 1:1 sessions with a specialist were preferred by 25% (10/42), a buddy scheme by 12% (5/42) mobile/internet support by 9% (4/42) and home visits by 9% (4/42).

What advice should the intervention programme include?

Mothers felt key elements of a programme to promote a healthy lifestyle and weight for postpartum women with GDM included an exercise programme (95%, 79/83), recipe ideas (85%, 71/83) and dietary advice (76%, 63/83). Sixty-one per cent (51/83) supported a weekly weigh-in session. Cooking skills sessions were the least popular element selected, in this sample of women (39%, 32/83).

Health care professionals considered dietary advice and an exercise programme to be the most important elements to include (92% and 91% respectively). Sixty-five percent (27/42) supported the inclusion of a weekly weigh in, 62% (26/42) recipe ideas and 57% (24/42) cooking skills sessions (Fig 4).

Mothers were less in favour of including cooking sessions (P=0.043) and general dietary advice (P=0.012) than were health professionals and preferred recipe ideas (P<0.001). (Fig. 4.).

Health behaviour and barriers towards optimal health behaviours amongst post-natal GDM mothers

When asked *Which of these factors, if any, is most important in reducing the risk of developing type 2 diabetes after GDM?* 13% said eating healthily, 7% maintaining a healthy weight, 2% exercising regularly and 78% said all of these factors were important. Overall, the respondents followed the dietary advice they were given in pregnancy (81% (67/83) agreed, Median 4, IQR 1) and in the postnatal period (65% (54/83) agreed, Md 4, 1) and felt they knew what they should be eating (81% (67/83) disagreed with the statement *I don't know what should be included in a healthy diet,* Md score 1, IQR 1). Mothers did not feel that time to prepare meals or the cost of healthy foods, were barriers to eating healthily (62% (51/83) disagreed that *cooking healthily takes too long,* Md score 2, IQR 1; 57% (48/83) disagreed with the statement *healthy food is too expensive,* Md score 2, IQR 2). Forty three percent (36/83) did not think it was too hard to think about eating healthily when you are looking after a new baby, (Md score 3, IQR 2) but 38% (31/83) felt it was. (Fig. 1). Barriers to exercise included tiredness ("*Women are too tired to exercise when they have a young baby*" - 65% (54/83) agreed, Md score 4, IQR 1) and the need for childcare ("*it is hard to exercise in the postnatal period because of the need for childcare*" (64% agreed (53/83), Md score 4, IQR 2). Seventy per cent of respondents (57/81) cited walking as a normal part of their daily routine as their main form of physical activity, 9% (7/81) walked specifically for exercise, 6% (5/81) did not exercise at all, and the remainder took part in a mixture of activities from organised sport, exercising to DVDs at home and using local sports facilities

such as gyms and exercise classes. The most commonly chosen factors that would help participation in exercise were free classes (36%, 29/81) and free childcare (33%, 27/81). Younger participants (under 35) had a more positive attitude to physical activity than older mothers (P=0.04) (Fig. 2). Losing weight was a concern for 69% (57/83) of the women (Md 4, IQR 1), 69% (57/83) felt it was important to aim to return to their pre-pregnancy weight (Md 4, IQR 2). Women who were overweight or obese were more likely to be concerned about losing weight than those of normal weight (P=0.03). Forty-one percent (34/83) of mothers agreed it was hard to focus on weight with a new baby (Md 3, IQR 2). Seventy-six per cent (63/83) would like more information about managing their weight in the postnatal period (Md 4, IQR 0). (Fig.3). Women were most likely to seek help to lose postnatal weight from friends and family (46%, 38/83) or a support group in the community (39%, 32/83). Thirty-six per cent said they would seek help from their GP, 23% (30/83). Forty-one per cent (34/83) said they would be more comfortable talking to a female health care practitioner, rather than a male, about their weight (Md 4, IQR 2) and this was not associated with ethnicity (P=0.287). (Fig.3).

The composite score from all the attitudinal health behaviour questions indicated a positive attitude towards postnatal health behaviour (mean 3.50, SD 0.39). This was not associated with ethnicity (P=0.117), BMI (P=0.272), Mothers' age (P=0.317) or mother's education (P=1.121). Mothers placed equal importance on the importance of exercise, weight management and physical activity (P=0.268).

Health professionals

Fifty-six percent of health professionals (26/46) did not think that women were aware of the importance of controlling their weight in reducing future risk of type 2 diabetes (Md score 2, IQR 1). Thirty-nine percent of health professionals (18/46) found it difficult to raise the issue

of weight with postnatal women who were diagnosed with GDM (Md score 3, IQR 2), compared to 59% (27/46) when advising pregnant women with risk factors for GDM, ("*I know I should talk about weight but sometimes it's a difficult subject to raise"*) (Md score 4, IQR 2). Eighty-three per cent (38/46) felt it was "*vital*" they raised the issue of weight in postnatal women who had been diagnosed with GDM (Md score 4, IQR 1). Healthcare practitioners agreed they would like to be involved in supporting women with postnatal weight management (69% (29/42) agreed, Md 4, IQR 1) and 41% (17/42) currently felt they were equipped to do so (Md 3, IQR 2). However, 83% (35/42) felt they did not have enough time to help postnatal women with weight-loss, in their day-to-day roles (md 4, IQR 0). Seventy-two percent of health professionals felt that exercising for health was not a part of their patients' regular behaviour. Perceived engagement in exercise was not associated with patient ethnicity in this sample (P = 0.082) although 87% (20/23) of healthcare practitioners dealing with BME patients felt exercise was not part of their patients' culture compared to only 57% (4/7) of those with a primarily Caucasian patient base.

Discussion

This survey was conducted to inform the design of a lifestyle intervention for postpartum women who had gestational diabetes in pregnancy, as per MRC guidance for complex interventions[18]. It provides novel data from a sample of UK postnatal mothers who had GDM and health professionals, about what they recommend for a postnatal lifestyle intervention to reduce the risk of the subsequent development of type 2 diabetes risk. Women in this sample were supportive of a group-based lifestyle programme offered in the community that included recipe ideas, an exercise programme and weekly weigh-in sessions. However, mothers also indicated significant barriers to engagement are present in the postnatal period.

This sample of women indicated that they were aware that eating healthily, keeping physically active and managing their weight are important in reducing their subsequent diabetes risk. However, a gap between knowledge and behaviour has been reported in the GDM postpartum population[19, 20], as well as a poor perception of personal risk which may limit personal behaviour change[21, 22]. More than half of the health practitioners in caring for GDM women in this survey, do not feel that women are aware of the importance of controlling their postpartum weight to reduce the risk of developing type 2 diabetes. Reducing postpartum weight retention is a key focus of postpartum lifestyle intervention; in women diagnosed with GDM, postpartum weight gain of 4.5kg, doubled the risk of subsequently developing diabetes within the 7.5 year follow-up[23, 24]. A modest post-natal weight-loss (anything more than 2kg) is associated with improved glucose metabolism at 12 months post-partum in women with GDM[25]. Studies have suggested that health practitioners' confidence in raising the issue of weight, may be a barrier to engaging obese pregnant women in managing their weight [26, 27]. Although healthcare practitioners in this survey also felt it was sometimes difficult to raise the subject, they considered this to be a "*vital*" part of their job.

Both healthcare practitioners and mothers agreed that exercise, dietary support were important elements in a postnatal lifestyle intervention for GDM mothers. A recent Cochrane review of lifestyle interventions after childbirth, supports that the most effective interventions for weight-loss include either diet or diet and exercise together[28]. Women in this sample wanted inspiration in the form of recipe ideas, rather than specific dietary advice or cooking skills support. The difference in the value placed on improving knowledge and cooking skills between the healthcare practitioners and mothers in this survey, may well be due to the demographic differences between the health practitioner patient base and mothers in this sample. Women in this study recognised the importance of physical activity although analysis

of a postpartum GDM cohort in Sweden suggested that in practice the postpartum physical activity level of GDM mothers may be lower than in mothers who had a normo-glycaemic pregnancy[20]. Results from the postpartum KAN-DO intervention trial, where women were overweight or obese when they entered pregnancy, showed very small increases in reported physical activity as a result of intervention, suggesting that tailored interventions are needed to help overweight postpartum women integrate physical activity and reduce sedentary behaviour[29].

While this study provides valuable insight into the acceptability of intervention and possible content and setting, we were limited by the small sample and self-selection of participants, affecting the representativeness of the sample. The mothers were primarily Caucasian and well-educated, which may limit how applicable the results are to low-income ethnic minority women who are particularly at risk. While health professionals who support women through pregnancy and their gestational diabetes management are well represented in this study, we had limited response from GPs and health visitors who may have provided further insight into the challenges faced by postpartum mothers. We were not able to calculate participation rate nor compare participants to non-participants as questionnaires were posted on online forums rather than targeted at a predetermined group. In addition, we are not able to comment on whether any differences in responses between Internet users and non-Internet users might exist.

Cultural acceptability of exercise varies it is recognised that it is less acceptable for women in South Asian communities in particular[30]. The health professionals' results indicate an awareness of cultural constraints towards exercise in ethnic minority patients. As BME women of reproductive age, are particularly at risk of obesity [31] and GDM[32], they are a key target for lifestyle interventions. Care therefore needs to be given to these cultural sensitivities when designing lifestyle programmes. The exercise element of lifestyle

intervention is most likely to be successful when objectively designed goals are used, for example 10,000 steps with a pedometer or use of heart-rate monitors[33]. Results from this survey suggest a focus on the inclusion of walking targets would be acceptable and achievable way to promoting an increase in exercise.

Postpartum women have proved hard to recruit and to engage in postnatal lifestyle interventions[34-36]. Our survey supports current literature that suggests looking after a new baby makes it difficult for mothers to focus on their health; lack of time to cook or exercise, lack of family support, low self-esteem and mood issues have all been shown to be negative influences[9, 37]. Postpartum fatigue may also be present for a number of months after delivery[38]. Timing of recruitment of postpartum mothers is likely to be an important consideration to maximise recruitment and retention of mothers in a lifestyle intervention [35]. Meta-analysis of behavioural change techniques used in lifestyle interventions, indicate that self-monitoring is a key strategy in intervention success, particularly if combined Control Theory such as specific goal setting or feedback on performance [39]. Encouraging women to regularly self-monitor and record their weight is a simple promising strategy [40] and has been validated for GDM mothers[41].

Pragmatic issues such as optimising convenience, timings of sessions and tailoring of the programme to personal needs have all been shown to be valuable strategies to improve engagement [35]. The acceptability of group sessions should be further explored. Home-based elements of support within an intervention have the capacity to be cost-effective and wide reaching compared to intensive face-to-face counselling[42]. The use of technology-based intervention needs further evaluation of the accessibility and appeal in the BME populations.

Summary and implications

Post-GDM mothers in this sample reported good knowledge of the health behaviour that would reduce their subsequent diabetes risk. They recommended that a lifestyle intervention should be group-based and offered in the community, although reported barriers of time constraints, child care issues and difficulty prioritising health, suggests that flexible options for engagement should be included– such as internet support and flexible sessions with inclusion of children or a childcare facility. While some were ready to engage relatively soon after giving birth, others would prefer lifestyle advice to be available when they were ready, suggesting a flexible window for recruitment may be beneficial.

Funding sources: No funding was received for this study.

Conflicts of interest: None

Acknowledgements: The authors would like to thank Diabetes UK, Netmums and Mumsnet for hosting a link to the survey.

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Figures

Fig 1

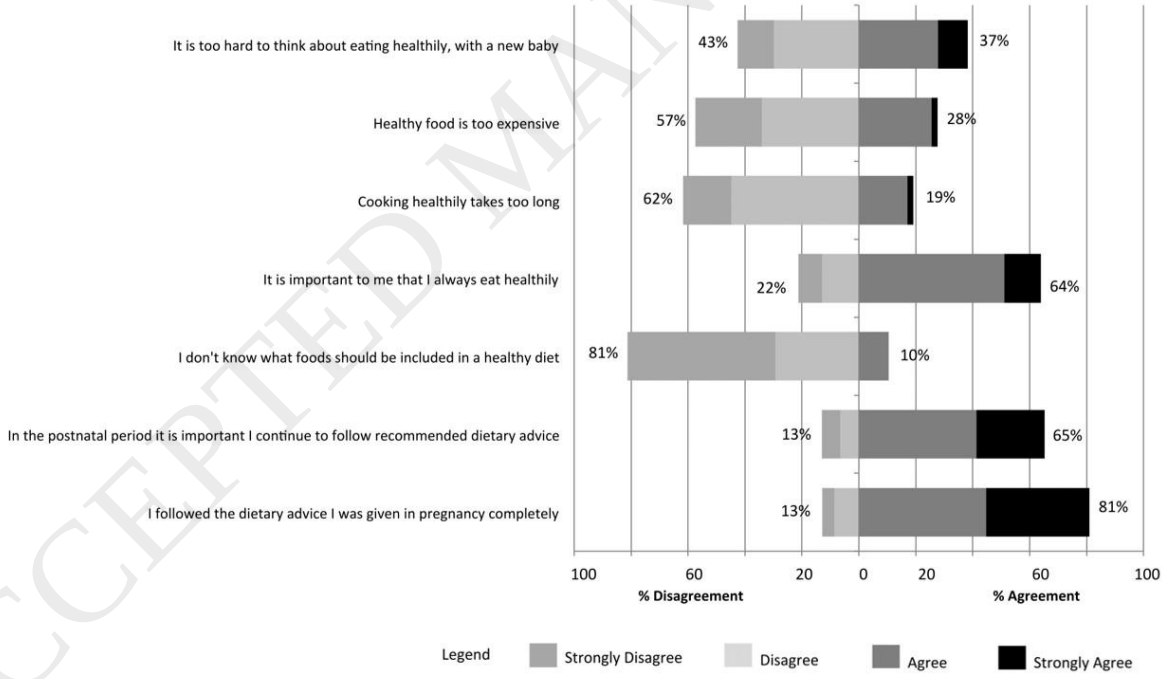

Fig 2

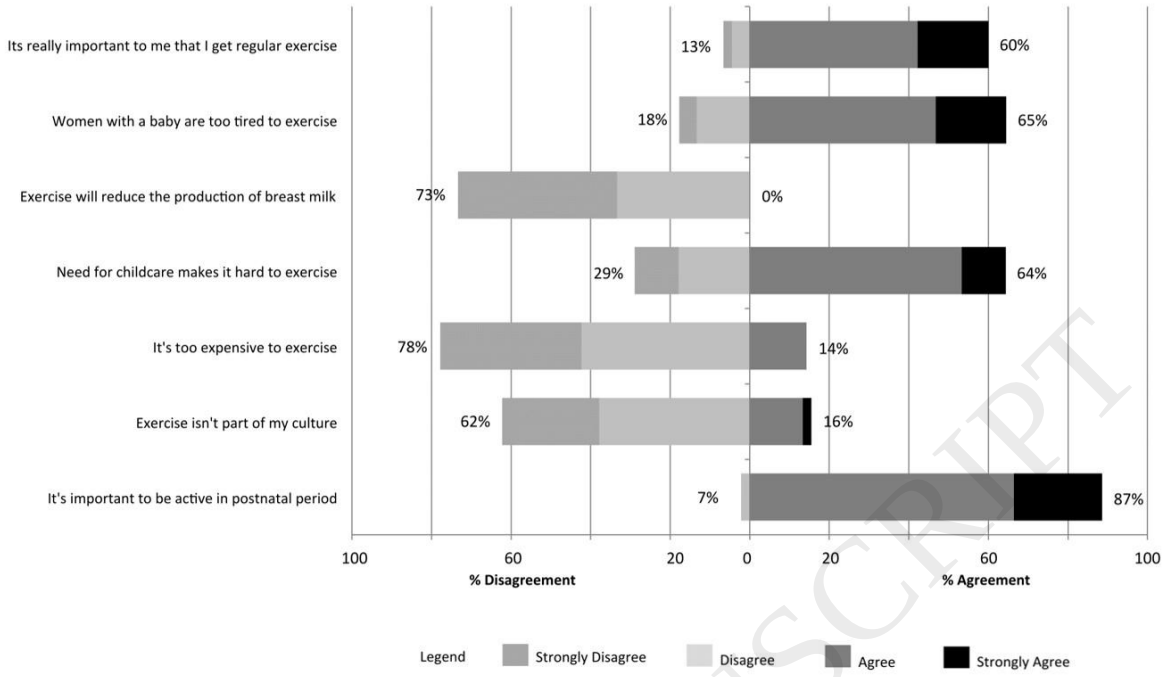

Fig 3

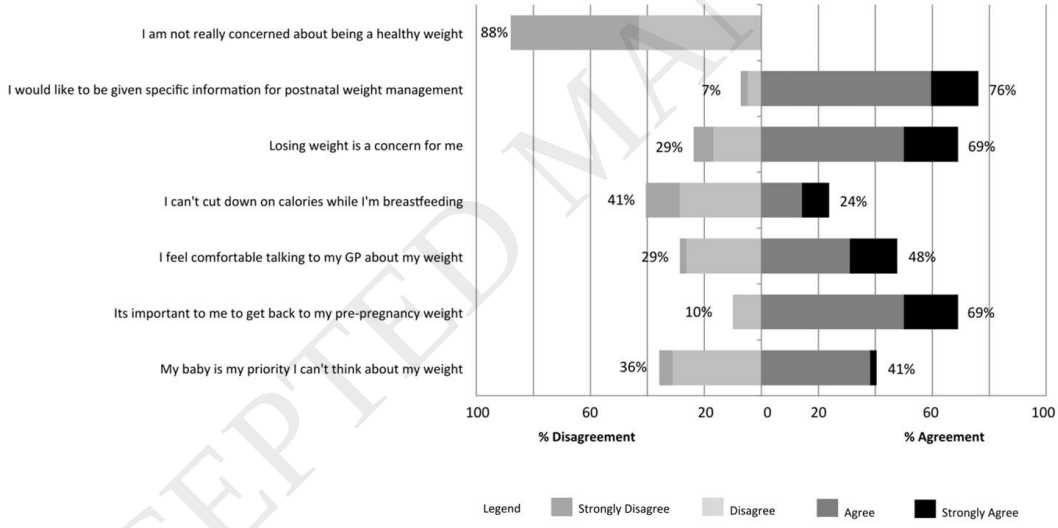

Fig 4

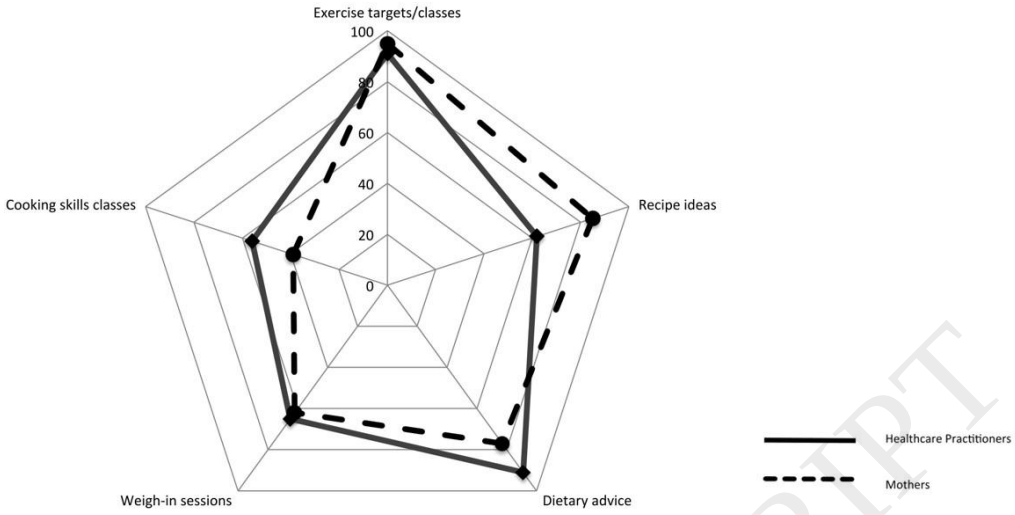

Table 1: Sample characteristics of the mothers who participated (n=83)

	n (%)	Mean ± sd
Age		34.8 ± 5.0
BMI		28.38 ± 5.04
BMI Category		
Normal weight	14 (17)	
Overweight/obese	48 (58)	
Unknown	21 (25)	
Educational Attainment		
GCSE	4 (5)	
A Level or equivalent	26 (31)	
Tertiary education	53 (64)	
Ethnicity		
Caucasian	56 (67)	
BME	27 (33)	
Age of youngest child		
Under 1	33 (40)	
1-2 yrs	20 (24)	
3+ yrs	30 (36)	